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DISINFECTING SEED POTATOES



Treating seed potatoes by soaking them in corrosive sublimate. Note the wooden tank and crates.

When the tank is filled with crates the liquid will cover the tubers

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DISINFECTION SEED POTATOES

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Seed-potato treatments to prevent certain kinds of seed-borne diseases have been improved and simplified. The long-time soak in corrosive sublimate or formaldehyde solution was effective from the standpoint of disease control, but was impracticable in large-scale operations because of the time consumed. In many parts of the country this method is giving way to the hot-formaldehyde treatment, which takes only a few minutes. The organic-mercury dip method affords the same advantage of timesaving without necessitating temperature control of the treating solution. Seed treatment is of proved value, and although many potato growers are adopting the improved methods, this step toward profitable potato production should be more widely taken.

WILL DISINFECTION PREVENT DISEASE?

Seed-borne potato diseases are of three kinds: (1) Those in which a lack of vigor is inherent in the tubers (virus or degeneration diseases such as mosaic, leaf roll, and spindle tuber)¹; (2) those due to internal fungous or bacterial infection which seed treatments can not reach²; (3) those due to surface infection by fungi and bacteria. Only the last class can be combated by seed disinfection.

Besides the seed tubers, the soil also may be contaminated by disease organisms. Seed treatment usually pays, even when the soil is contaminated, because it kills the disease organisms that are on the set and therefore most favorably situated to cause decay or injure the sprout. However, the effectiveness of seed treatment may be greatly lessened by soil contamination; hence the need for crop rotation, and in some cases special soil treatments. (See "Common scab.")

WHAT DISEASES ARE REDUCED BY SEED TREATMENT?

(1) *Common scab*.—Common scab causes corky incrustations, or rough-pitted spots, isolated or spread over the tuber, usually shallow or slightly raised, sometimes fairly deep. Most severe on light, dry, well-aerated soils, especially if frequently cropped and deficient in humus. Is augmented by lime and fresh manure. Is reduced by crop rotation, use of humus-building crops, and soil acidification by sulphur and acid-producing fertilizers.

(2) *Black scurf, Rhizoctonia*.—Black scurf appears as black, tightly adherent particles on the skin of potato tubers; also causes russetting and cracking of the skin. On the growing plant it causes sprout injury, stem rot, girdling, and aerial tubers. An important factor in delayed and uneven stands. Cumulative and persistent in the soil when frequently cropped to vegetables.

¹SCHULTZ, E. S. WHY POTATOES RUN OUT. U. S. Dept. Agr. Farmers' Bul. 1436, 21 p., illus. 1924.

²SHAPOVALOV, M., and LINK, G. K. K. CONTROL OF POTATO-TUBER DISEASES. U. S. Dept. Agr. Farmers' Bul. 1367, 37 p., illus. 1924.

(3) *Blackleg*.—Blackleg appears as a dark discolored area extending into the tuber from the stem end and followed by decay. The decayed tissue is moist or slimy and is usually demarcated by a black line at the margin. In the field it causes rot of the set or of the basal part of the stem, accompanied by intense blackening.

BLIGHT AND STORAGE ROTS ARE NOT CONTROLLED BY SEED TREATMENT

Tubers affected with late-blight rot, wound rot, wilt (brown discoloration at stem end extending into the tuber in strands), or other forms of internal discoloration and breakdown should not be planted, since seed treatment does not eliminate danger from these defects. However, seed treatment helps to reduce the risk of contaminating healthy potatoes which are handled together with diseased ones and hence lessens rotting of sets.

SEED TREATMENT IS PROFITABLE

By the use of quick methods of disinfection, whereby one man can easily treat 100 bushels of seed in a day, the cost of seed treatment can be brought down to \$1 an acre. Gains in yield as a result of seed disinfection frequently reach 20 to 30 per cent, and the gain in yield and quality of prime stock is often even greater.

WHAT KIND OF SEED TO PLANT

Seed potatoes should be (1) of a variety adapted to your season, (2) produced in a region favorable to vigorous growth of potatoes, (3) derived from healthy plants, and (4) firm and unsprouted. Certified seed carries a record of its source and a generally reliable declaration that the proportion of disease does not exceed certain low limits. It usually outyields uncertified seed of whatever origin and is vastly preferable to seed of doubtful source and history.

SHOULD APPARENTLY CLEAN SEED BE TREATED?

Is it necessary to treat seed that shows no visible disease? Under certain conditions treatment of such seed is unnecessary. However, seed treatment often keeps sets from decaying after they have been planted. In parts of the country where the rotting of sets is a serious problem seed treatment of apparently clean seed is likely to pay.

SORTING

Potatoes showing severe scab or black-scurf infection should not be used for seed, even though treated. Tubers affected with rot or internal discoloration of any kind should be discarded from the seed stock.

WHEN TO TREAT

Seed treatment should be given before sprouting occurs and prior to cutting. Treatment may be carried out several weeks in advance of cutting if care is taken not to place treated tubers in bags, baskets, or bins in which untreated potatoes have been stored, unless the containers also are disinfected.

If potatoes are not planted at once after they are cut, the sets should be placed in crates or baskets of not more than 1-bushel capacity; they should be protected from heat above 70° F. and from rapid drying; and they should be poured from one container to another several times to keep them from sticking together.

METHODS OF TREATMENT

(1) CORROSIVE SUBLIMATE

Dissolve 4 ounces of corrosive sublimate in 2 quarts of hot water, then make up to 30 gallons with cold water. Use only wood, enamel ware, or concrete vessels, since this solution corrodes metals and is weakened thereby. The solution weakens with use; therefore 1 ounce of dissolved sublimate to each 30 gallons of solution should be added after each lot has been treated. An entirely fresh solution should be prepared after treating four lots.

The standard time of treatment is one and one-half hours.

In order to shorten the process, the tubers may be dipped in or sprinkled with water, then covered with burlap sacks so as to keep moist for a day or two before being treated. The soaking period may then be reduced to one-half hour.

CAUTION.—Corrosive sublimate is a deadly internal poison, but is not dangerous to handle. Treated potatoes should not be used for food or fed to livestock.

(2) COLD FORMALDEHYDE

Add 1 pint of fresh commercial formaldehyde (or formalin) to 30 gallons of water. The solution does not weaken with use and does not injure metal containers. Soak the tubers one and one-half hours. If the tubers are sprinkled first and kept moist, as described above, the time of treatment can be shortened to one-half hour and effectiveness increased.

(3) HOT FORMALDEHYDE

The solution is prepared by adding 1 pint of formaldehyde to 15 gallons of water. It must be heated to 124°-126° F. and the temperature must be accurately maintained within this range during the treatment. The time should be three to four minutes, but no longer.

Individual growers sometimes use a large kettle mounted over a temporary fireplace to carry out the hot-formaldehyde treatment, but temperature control is likely to be poor and the results erratic.

The hot-formaldehyde method is particularly adapted to community seed-treating organizations. In this way a carload or more of seed potatoes can be treated in one day and at minimum expense. Community seed-treating outfits are preferably operated with steam supplied by a creamery or tractor boiler. Complete portable outfits designed for efficient and convenient operation are on the market.

(4) ORGANIC-MERCURY DIP

Special directions are given on the containers in which these dip products are sold. The treating solution is usually made by adding 1 pound of chemical to $2\frac{1}{2}$ gallons of water. A true solution is not formed, but instead a milky liquid containing suspended particles of the chemical. Dipping the tubers momentarily suffices to coat them with the chemical, which, being insoluble, is not readily washed away after planting. Thus the fungicidal action is prolonged.

HANDLING OF THE POTATOES DURING TREATMENT

Potatoes are most conveniently treated in wire baskets or slatted wood crates. Metal containers, however, can not be used with corrosive sublimate. Burlap bags are less desirable, as they cause corrosive-sublimate solutions to lose strength and impede the rapid coating of the tubers in the organic-mercury dip. A drain board should be attached to the treating vessel to carry the surplus solution back into the vessel.

